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DAMAGE TO FIRE HYDRANTS BY MOTOR VEHICLES[1]

W. W. **Brush**: Damages to fire hydrants by motor vehicles and remedies for the trouble are becoming of increasing importance in all cities. In New York the damages of this nature have been increasing rapidly during the last two years. The number and size of motor vehicles on the streets are growing rapidly, and the drivers have not yet learned the limitations that must govern them if injury to pedestrians and damage to property are to be prevented.

Either trucks or passenger cars may strike objects above the sidewalk level which are placed inside the curb line, by skidding on wet pavement, by backing up to the curb, the overhang of a truck extending 2 or 3 feet beyond the curb line, or by intentionally driving up on the sidewalk. Practically anything inside the curb line will give way if hit by a 3-ton or 5-ton truck. The fire hydrant, which is usually located about 18 inches inside the curb, is most liable to be hit, as it cannot be readily seen by the driver who is backing his truck against the curb, and is also in a favorable position to be hit at the corner when a car skids in making the turn. During the past two years, New York has had on an average about 400 hydrants destroyed annually through being struck by motor vehicles, largely trucks.

Up to three or four years ago this trouble was of minor consequence, but with an annual destruction of 400 hydrants the repair bill amounts to $12,000 a year. Originally the Department replaced the hydrants or scrapped the damaged parts. The development of the process of electrical welding made it possible to have the standpipes welded, thus avoiding the loss involved in scrapping them. This work is done in the Department's shops for about $6 per standpipe, without any allowance for overhead; if the work is done in private shops the cost is $8 to $10. To weld the standpipe and assemble the hydrant in the Department's shops costs about $12.50. The cost of removing and replacing a hydrant, exclusive of its repair, is estimated at $20. The total outlay for 400 hydrants therefore reaches the sum of $12,000, as previously stated. At first thought it may seem that some change is necessary in the type or location of the hydrant in order to avoid this expenditure, but when that expense is distributed over the 40,000 hydrants in New York the unit expense is reduced to an average of 30 cents per hydrant annually. This average cost for the entire number of hydrants should be increased to show the actual cost where the traffic is heaviest and decreased where it is lighter. In the Boroughs of Manhattan and the Bronx where the traffic is very heavy, the number of hydrants broken represents about 350 out of the total 400 broken annually in the entire city. In that area there are over 21,000 hydrants. The resultant average cost is 60 cents per year per hydrant.

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[1] Informal discussion at the Buffalo convention, June 10, 1919. Further discussion of this subject is requested and should be sent to the Editor.

The speaker knows of no preventive remedy that can be employed at a reasonable cost. Cases are rare in New York when the escaping water from a broken hydrant causes the serious damages reported from other cities. When a hydrant standpipe is broken it is simply a question of repairs, as a rule, and the loss of water is negligible. In one instance a high-pressure hydrant placed in a vault recess was broken below the valve of the hydrant. The water blew in a property wall of a large office building back of the hydrant and caused many thousands of dollars damage. Engineers of cities using a type of hydrant which opens with the pressure report that they have had serious difficulty from damages due to water escaping from broken hydrants of that type. This trouble has been reported as particularly serious at Boston, where it led to a change in the type of hydrant.

The thickness of the wall of the hydrant seems to have little effect upon the resistance to breakage by impact with a truck. Hydrants protected by fenders have been broken, so the speaker doubts if there is any effective protection against heavy trucks. Welding the broken parts seems to be the cheapest solution of the trouble in New York at present. The welding is done by the oxy-acetylene process but the electrical process will doubtless do as good work. The broken hydrant is taken to the shop, the broken section cut away at a bevel of about 45 degrees and new metal is fused on at the break. If the portion of the hydrant thus treated is to be exposed above ground, it is finished off after the welding is completed, but if the weld is buried in the ground the surface of the metal is left rough.

Where any damage results to private property from a hydrant broken in the manner under consideration, the city is not held responsible provided it has used reasonable diligence in shutting off the water after the hydrant was broken.

F. W. Cappelen: The subject of damage to fire hydrants by motor vehicles is apparently as important in other cities as in Minneapolis. There the various propositions suggested as remedies for the troubles have all been considered without arriving at any definite conclusions.

Minneapolis is fortunate in having in use only the compression-type hydrant. In only one case of breakage was there any loss of water with resulting damage. This was due to the fact that the hydrant was set in a brick well, so that it was free to give way to the shock. The post of the hydrant was broken into three pieces by the impact of the automobile and the branch was also broken between the hydrant valve and the main, thereby permitting the water to escape. This same hydrant was replaced by a Darling hydrant with a 9-inch post, set firmly in the ground. Being located at an angle in the street, it also was struck later, with no damage to the hydrant. The post withstood the shock while the occupants of the automobile had to send two of their number to the hospital.

The remedies that have been suggested are:

1. Move hydrants back from curb to building line.
2. Substitute flush hydrants for post hydrants.
3. Employment of fenders or guards.
4. Repair by welding and reset in present locations.

In discussing this matter it might be well to consider first the cause of the damage. Motor vehicles unavoidably, the drivers claim, collide with hydrants:

(a) By skidding on wet or slippery pavements.
(b) As the result of collision of two or more vehicles.
(c) Speeding around a curve, or corner.
(d) Trucks backing into hydrants.

The records at Minneapolis show that only one hydrant has been broken which was not located at a street intersection but midway in the block. This hydrant was located in the wholesale district, where a truck attempted to turn around in the middle of the block and backed into the hydrant mentioned, thereby causing the damage.

Cases of collision and skidding generally occur at the intersection of streets and are due to the misunderstanding of the drivers as to the intent of others. This results in smash-ups or the forcing of one or the other of the meeting vehicles over the curb. If a hydrant is in the way, it is at once the victim and suffers damage. It has also been noted that many of the accidents are marked by evidences of considerable force so that in order to resist shock hydrants or other objects for that matter must have considerable strength.

There are certain street intersections which are exceptionally dangerous. Minneapolis has certain places where broken hydrants are "repeaters;" the hydrant on a certain corner has been broken four times in succession and at another location the damage has occurred twice.

Four remedies are offered, as follows:

1. It has been suggested that hydrants be set back from the curb and close to the building line. It is not considered good practice to set hydrants close to a building, which itself might become a fire victim thereby rendering the hydrant useless. Unless the hydrant was set back to some point inside the walk, it would probably not be safe from damage, as vehicles crossing the curb would cause the same injury as though the hydrant had been located directly at the curb. Also, in the down-town district where most of the accidents of this nature occur, the area-ways under the sidewalk would preclude the moving of the hydrant in this direction. A further objection would be the inaccessibility of such hydrants to the fire engines, and the risk of having them too close to the buildings.

2. The use of flush hydrants or hydrants under cover and grade might be a solution in warm climates, but unless marked by some kind of post, which in turn would be in danger of being struck, it would be difficult to locate flush hydrants quickly under snow and ice. Frozen covers would delay their use and the inconvenience of connecting to such hydrants would cause them to be very unpopular with fire departments. As a matter of fact, Minneapolis had about 24 such hydrants which were replaced by post hydrants for the reasons stated. While the use of flush hydrants might overcome the trouble, the expense of making the change would be enormous, and while it would be unnecessary to change all hydrants, the use of two kinds would prove confusing, particularly in an emergency. The principal objection to flush hydrants in cold climates is the annoyance of having the pit fill with slush and water and freeze solid at a conflagration of several hours' duration.

3. Experience at Minneapolis with hydrant guards shows that they are not very effective. Hydrants have been broken off where 6-inch pipes have been set in the ground to protect them. Not only have the hydrants been broken but the guards themselves were broken by the shock. Guards or fenders would have to be very substantial to be effective and would thereby prove undesirable obstructions, not only to traffic but also to the fire department's use of the hydrants. Guards will also involve considerable expense, and if there is any doubt as to the effectiveness of their use the expenditure for them is not justified.

4. Minneapolis has followed the practice of repairing the hydrants thus broken by welding whenever possible and replacing them in their former locations. Occasionally a hydrant is broken beyond repair, but generally they can be mended. During the past 15 months there have been 43 hydrants broken in Minneapolis. The average expense per hydrant has been as follows:

Excavation, removal and resetting	$14.40
Shop work and assembling	3.84
Welding (done by private concerns)	10.47
Cartage	2.50
Total	$31.21

In but very few cases is the city able to collect damages for breakage. It is necessary to get proper evidence and then it must be shown that the drivers were careless, negligent or malicious. In some cases, where a firm's truck is found on the wreck, the owners will pay.

The 5-inch Mathews hydrant is very susceptible to breakage, especially if it is located in a brick well which allows some freedom of movement. A hydrant without jacket set in the ground will resist a considerable blow and in some cases a 7-inch post will be pushed over somewhat without breaking. This suggests the advisability of using hydrants with a large, strong barrel or post set firmly in the ground. Such hydrants should be of the compression type.

If anything further is to be added to this question, it is to call attention to the natural inference from the fact that no less than 95 per cent of the breakage is done at street intersections, namely, to avoid setting hydrants in the danger zone. If hydrants are to be moved at all they should be moved away from the corner and set at a distance of a lot or two lots away from the line of the intersecting street. They could be located on the lot line where they would be less obstruction than at the corner.

The only reason for setting hydrants at corners, is to permit running hose lines down either intersecting street. With the short removal from the corner suggested, this can still be done with almost equal facility and less danger. The proximity to fires would be the same in either case, and when streets are fully gridironed by water mains, there is really nothing but custom that calls for the corner location. Now that this new menace has appeared it would seem that custom would have to give way to practical requirements. This solution would be a modification of the first suggestion, i.e., to move the hydrant, not back, but away from the corner.

Richard Whitney: The particular type of damage under consideration has not occurred often enough in Syracuse, N. Y., to be thought of as a very serious problem. Although the water department has no special record of such accidents and the repairs incidental thereto, the number of such accidents which occur per annum does not exceed ten, and is probably much less than that number. In the system of nearly 4,000 hydrants, that makes the percentage damaged by this cause per annum about one-fourth of one per cent. There has never been any flood condition from an accident of this kind.

One particular hydrant in the system has been broken off three times in the past two years and has now been moved back from the curb as far as practicable. This hydrant is at an intersection of a wide and a narrow street, where the great volume of traffic turns from the wide to the narrow street. If the hydrant were placed on the opposite corner, the trouble would be largely, if not entirely, eliminated.

Of all accidents upon which reliable information is available, all but two were caused by pleasure cars. The drivers either lose control of the car, fail to judge the turn correctly, or are forced to jump the curb to avoid a more serious accident. One truck driver when ascending a steep hill, found that he was unable to reach the top and the brakes would not hold. He thereupon steered backward for a hydrant, with the hope that it would arrest his precipitous progress. The result can be easily imagined.

The Syracuse practice has been to repair the old hydrant or reset a new one and where practicable to move it farther away from the curb. The broken parts of the hydrant can usually be welded. The expense involved is borne by the one who causes the damage, when it is possible to get this information, and averages not far from $55.00 for each offense. The department expects to continue this practice. The expense entailed in changing to a different type of hydrant, as a flush hydrant, for instance, would not be warranted in Syracuse, where the total damage is so slight. The department hopes to study traffic conditions somewhat, in the future, in placing new hydrants and also to set at critical points hydrants which have the least tendency to open when broken.

A. W. CUDDEBACK: The number of hydrants broken in Paterson, N. J., is about the same percentage as in Brooklyn, N. Y. About half of the injured compression hydrants break off down near the valve. It does not seem feasible to consider a general change in the location of hydrants. The speaker has not found that hydrants opening with pressure are any more liable than other types to cause damage through flooding. In practically all cases, the Passaic Water Company has been successful in fixing the responsibility on the person committing the damage.

EDWARD E. WALL: There have been thirty-two cases of damage done to fire hydrants in St. Louis by moving vehicles and cars during the past year. The total cost of repairing these 32 hydrants was $1097.21. The Water Division has collected from the parties responsible for the damage the sum of $542.62. Some of the bills still unpaid will be collected later on, but in a number of these cases no damage will be collected for the reason that the parties are in some cases unknown, in other cases are not financially responsible or are non-residents so that an attempt to get service on them and bring suit would cost a great deal more than the damage amounts to.

In three cases damage was done by wagon, in nineteen cases by automobile (passenger cars), in four cases by trucks, in one case by street car, in one case by switch engine and in four cases by freight cars.

The cost of repairs per case ranges from a minimum of $3.95 to a maximum of $97.50.

A number of cases occurred on account of machines or trucks skidding on wet streets. At least two cases were caused either by collisions of two machines or in the attempt to avoid collision.

In one case there was a collision between two automobiles at a street intersection in which one of the colliding machines was thrown violently against a machine standing at the curb, driving it against the fire hydrant. This brought up an interesting question as to who was responsible for the damage—the innocent by-stander, or the machine that collided into the standing vehicle, or the one that was the cause of the collision. The Water Division has not been able to decide this question, and the damage remains unpaid to this day.

In another case the owner of a truck, who was driving it himself, stopped his machine at the top of a grade and went into an adjoining store. Either his brake was not put on properly or it would not hold, and the truck started down hill. Hearing the noise, he rushed out but was unable to catch the machine, as it had made considerable headway before he appeared. It traveled about a block and ran into a fire hydrant, breaking it short off at the ground. The owner who, by the way was a native of sunny Italy, protested that it was not his fault that the machine ran away, brought his alderman and some other influential men to testify to his poverty and ask that he be excused from paying any damages on the ground that the whole occurrence was an act of Providence.

As the Water Division has more than 12,000 fire hydrants in service, thirty-two accidents in one year, more than half of which have been paid for, do not seem to constitute a very serious matter or one that would require any change in the design of the hydrant or the method of locating them just inside the curb.

Thirty years ago practically all the hydrants in St. Louis were of the under-ground type. These were abandoned for several reasons, among them being the impossibility of quickly locating the hydrant after a snow fall in the winter time. It used to be one of the emergency duties of the Street Service Section to get out after every snow storm, day or night, and clear off the covers of all under-ground hydrants. Another objection to the under-ground hydrant was the likelihood of the cover plate being knocked out of place, leaving a dangerous opening in the sidewalk or forming an obstruction over which pedestrians might stumble and fall. The city had numerous law suits over this before these under-ground hydrants were finally abandoned, especially in the business district.

They have been replaced by the single-nozzle self-draining post hydrant, which has given excellent satisfaction. Both the under-ground fire hydrant and the old style of post hydrant in use in St. Louis require a box around them with a cast iron cover. This box is for the purpose of giving access to the joint between the fire hydrant and the gooseneck and also to allow for opening and closing the cock which drains the barrel of the plug. Every winter it is necessary to continuously inspect these hydrants to see that the drain cocks are open. The cost of the surrounding box with a cast iron cover runs from $12 to $15 per hydrant. The present design of hydrant requires no box or cover and costs no more than the old hydrant. During the extremely cold weather of 1917–18 not one of these self-draining hydrants was frozen.

C. W. **Wiles**: It has been the experience at Delaware, Ohio, that if a hydrant has its parts made on the interchangeable system it is more economical to replace parts that become broken than to weld the broken parts. If a hydrant becomes broken and it has no valve, the trouble is so great that the value of a valve is realized at once. Twenty-five years ago valves were rarely inserted on hydrant branches but today it is standard practice. Every new hydrant installed at Delaware has a valve, and valves are being placed on some of the old hydrant connections.[2]

W. S. **Cramer**: The speaker is from a small city of 40,000 population, where 12 hydrants were broken last year. All but one were repaired in a local machine shop by the oxyacetylene process at an average cost of $6.50; the exception was a case where the party breaking the hydrant had it repaired.

Moving hydrants is a subject provided for in the contract between the city and the water company, and all hydrants must be placed at locations selected by the chief of the Fire Department. No hydrant once set can be moved except by a city ordinance and at the expense of the city.

F. T. **Kemble**: It would be instructive to learn about any experience in setting hydrants back from the curb against a building. The only practical objections to this would be the possibility of damage in the cellar of the adjoining building in the event of any leakage and the difficulty of connecting up the fire engines. It would be necessary for them to use longer hose or else run up on the sidewalk. If a fire was so hot that it was impossible to handle the engine close to a building, it would hardly be possible to stay at the curb, but 15 feet further away. The hydrant close to the building would probably interfere with foot traffic less than out at the curb, and it would be safe from automobiles.

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[2] At this point in the discussion President Henderson called for a vote, by show of hands, of members using valves on hydrant branches and those omitting them, and a very large proportion of those voting was shown to be using such valves.

A number of hydrants are smashed every year at New Rochelle, N. Y., sometimes by trucks backing into them, but more often because of the careless driving of touring cars. In this section there are two roads, the Boston Post Road and the road along the Long Island Sound shore, on which automobiles are about as thick as they can be found anywhere. Hydrants are not apt to be troubled on these roads. It is generally on the semi-country roads, where often there may not be a curb, that the car skids or because of carelessness is run into a hydrant.

In nearly every instance where a hydrant has been smashed by an automobile, it has been possible to collect charges for the damage. Whether touring car or truck, it has generally been so damaged that it was possible to find out about it.

J. N. Chester: In small towns supplied by water works with which the speaker is familiar there are only one or two hydrants damaged annually. Usually there is a parking strip back of the curb and the hydrants are set back of this, so that unless a truck climbs the curb there is little chance of damage along streets laid out with such parking. When only a few hydrants are damaged annually it is probably less expensive to buy repair parts than to maintain a welding outfit to repair the broken parts. Such a welding outfit may well be advantageous in a large water works where it can be kept fairly busy, just as a large steel mill finds it advantageous to maintain a machine shop, but a small water works will probably not find any financial advantage in providing facilities for unusual repairs requiring skilled men to handle them properly.

Seth M. VanLoan: Approximately three hundred fire hydrants were broken by automobile trucks in Philadelphia in 1918, and the average rate of one a day is continuing through 1919. The congested central traffic zone is practically free from accidents of this nature. The bulk of the trouble occurs on main streets outside of the central district, probably because of the tendency on the part of automobile trucks to increase speed where traffic is lighter or where wider streets incite to such higher speeds.

The majority of the Philadelphia hydrants are located at street intersections, placed 12 inches back from the curb on the house line. A few are placed in the center of blocks and the proportion of these which have been broken is nearly as high as those placed at intersections.

A number of hydrants have been broken on comparatively narrow double car-track streets paved with granite block. This is caused by the fact that trucks ordinarily ride the rails and in turning out from the rails the rear of the truck swings to the curb line and remains in that position for several feet before reaching alignment. The overhanging truck body is thus brought in position to interfere with the fire hydrant. Other accidents occur in the delivery of goods where trucks back up to the curb, in which cases also the overhanging truck body sometimes comes into collision with the fire hydrant. To this is attributable the majority of accidents occurring to fire hydrants placed in the middle of blocks.

Philadelphia uses the compression type of hydrant valve and has consequently experienced a minimum of trouble from washouts or loss of water because of accidents.

Various remedies have been suggested. If hydrants could be placed so as to give 24 inches clear space from the curb to the face of the hydrant, the number of accidents would be greatly reduced. A somewhat similar remedy would be to place the hydrants at the building line. Both of these remedies are objectionable in Philadelphia because of narrow sidewalks in many parts of the city.

Another suggested remedy which has received some consideration in Philadelphia is a sub-surface hydrant protected by a hinged cover arranged to be opened by a post attached to the cover at the opposite end from the hinge. This post would serve to readily indicate the location of the hydrant and would furnish sufficient leverage to open the cover even when it is more or less obstructed by ice or snow.